DETAILED ACTION

Response to Arguments

1. This office action is in response to the amendment filed on 10/02/2009. Claims 1-34 are pending in this application and have been considered below.

2. Applicant arguments regarding the rejection under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (US 6,067,292) in view of Strom et al. (US 20020131537) have been fully considered but they are **not persuasive**. The examiner thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

Applicant's argument: The applicant argues that "Claims 1-3, 6-7, 10-17, 20-23, 26-29, and 32-34 stand rejected under 35 USC 103(a) as being unpatentable over **Huang et al. in view of Kadous et al**. The examiner alleges that the combination of Huang et al. and Kadous et al. discloses all claimed features and therefore makes the claims unpatentable for being obvious. This allegation is not supported by the cited references; applicants respectfully traverse the rejections for the following reasons".

Examiner's response: The examiner would like to point out that the prior art "**Kadous et al**." was not cited as a prior art in the last office action mailed on 07/21/2009 (see page 2 of the office action mailed on 07/21/2009). The rejection in last office

action mailed on 07/21/2009 was made using **Huang et al. (US 6,067,292) in view of Strom et al. (US 20020131537)** (see pages 2-12 of the office action mailed on 07/21/2009). No claim was rejected using Huang et al. in view Kadous et al. references in the last office action (see pages 2-12 of the office action mailed on 07/21/2009). **Therefore, the arguments offered by the applicant's representative (filed on 10/02/2009) are irrelevant and not applicable to the last office action mailed on 07/21/2009. Because no relevant and applicable arguments were offered by the applicant's representative, the examiner position with regards to the last office action rejection mailed on 07/21/2009 remains the same; therefore, this office action is made final.**

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 6, 7, 10-17, 20-23, 26-29, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (US 6,067,292) in view of Strom et al. (US 20020131537).

Regarding claim 1:

As shown in figures 1-23, Huang et al. discloses in a receiver of a communication system, a method for reducing noise in a transformed signal (col 1, lines 35-37), said transformed signal having a plurality of signal components on different subcarriers which are orthogonal to each other (col 2, lines 11-25), said method comprising the steps of:

- receiving the transformed signal by a detector of said communication system (603 and 604 in figure 6);
- processing the plurality of signal components of said received transformed signal (605 in figure 6, 2203, in figure 22), wherein said processing step comprising:
- reconstructing (606 and 607 in figure 6, 607, 606 in figure 22) a predetermined number of times, by a reconstructing module, said identified one or more signal components (figures 22 and 23); and
- replacing said identified one or more signal components for reconstruction in said received transformed signal (figure 8) with the reconstructed one or more signal components to provide a new transformed signal having one or more reconstructed signal components (col 7, lines 65-67, col 8, lines 1-22).

Huang et al. disclose all of the subject matter as described above except for specifically teaching identifying one or more signal components having one or more smallest channel coefficients based upon a channel estimate of said plurality of signal components; with reduced noise; to thereby reduce noise in said identified one or more components; thereby outputting the new transformed signal with reduced noise.

However, Strom et al. in the same field of endeavor teach identifying one or more signal components having one or more smallest channel coefficients based upon a channel estimate (214 in figure 2) of said plurality of signal components; with reduced noise; to thereby reduce noise in said identified one or more components; thereby outputting the new transformed signal with reduced noise (figure 4, abstract, par 0013-0014, 0016, par 0052, 0067, 0088-0092). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the method and system of channel coefficient estimation and noise reduction as taught by Strom et al. to modify the system and method Huang et al. in order to reduce the noise of the transmission channel.

Regarding claim 2:

Huang et al. further discloses wherein said processing step comprises the step of providing an estimated signal from said transformed signal at output of said detector and based upon said channel estimate (700 and 700’ in figure 7, col 8, lines 43-46).

Regarding claim 3:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said estimated signal using a plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 6:

Huang et al. further discloses wherein said reconstructing step further comprises the step of providing another estimated signal from said reconstructed

transformed signal at said output of said detector and based upon said channel estimate (figures 7, 8, and 9).

Regarding claim 7:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said another estimated signal using said plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 10:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether said one or more signal components has been reconstructed said predetermined number of times (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 11:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether to process another one or more signal components of said plurality of signal components (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 12:

Huang et al. further discloses and further comprising the step of providing current estimated signal for subsequent processing when determined that iteration of said another signal component is not required (this limitation is interpreted to be part of decision making) (2203 in figure 22).

Regarding claim 13:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 14:

The method as claimed in Claim 13, wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 15:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said one or more signal components (606 and 607 in figure 6).

Regarding claim 16:

Huang et al. further discloses wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said one or more signal components (606 and 607 in figure 6).

Regarding claims 17, 23, and 29:

As shown in figures 1-23, Huang et al. discloses a receiver for reducing noise in a transformed signal, said transformed signal having a plurality of signal components on different subcarriers which are orthogonal to each other(col 2, lines 11-25), said receiver comprising:

- a signal reconstructing section (606 and 607 in figure 6) having:
- a detector for detecting said transformed signal (603 and 604 in figure 6);

- one or more decision modules (2301, 2302, 2303, and 2304 in figure 23), each of said one or more decision modules having an input coupled to output of said detector (see figure 23); and
- a reconstructing module (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23) having one or more inputs (1710, 1710', 1710" in figure 23), said one or more inputs being respectively coupled to output of said one or more decision modules (see figure 23),
- wherein said identified one or more signal components are reconstructed (1710, 1710', 1710" in figure 23) a predetermined number of times to thereby reduce noise; and
- wherein the identified one or more signal components for reconstruction are replaced with the reconstructed one or more signal components (col 7, lines 65-67, col 8, lines 1-22).

Huang et al. disclose all of the subject matter as described above except for specifically teaching wherein said reconstructing module is adapted to identify one or more signal components having one or more smallest channel coefficients based upon a channel estimate of said plurality of signal components; to thereby form a new transformed signal with reduced noise.

However, Storm et al. in the same field of endeavor teach wherein said reconstructing module is adapted to identify one or more signal components having one or more smallest channel coefficients based upon a channel estimate (214 in figure 2) of said plurality of signal components; to thereby form a new transformed signal with

reduced noise (figure 4, abstract, par 0013-0014, 0016, par 0052, 0067, 0088-0092). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the method and system of channel coefficient estimation and noise reduction as taught by Strom et al. to modify the system and method Huang et al. in order to reduce the noise of the transmission channel.

Regarding claims 20, 26, and 32:

Huang et al. further discloses wherein said reconstructing module (606, 607 in figure 22) is adapted to perform reconstruction based on a relationship between a received signal component and a transmitted signal (figures 1, 2, and 6 col 17, lines 30-33).

Regarding claims 21, 27, and 33:

Huang et al. further discloses wherein said reconstructing module is adapted to perform simultaneous reconstruction of two or more of said one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claims 22, 28, and 34:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction of said one or more signal components signal components one at a time (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

5. Claims 4, 5, 8, 9, 18, 19, 24, 25, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. in view of Storm et al. as applied

to claims 3, 7, 17, 23, and 29 above and further in view of Dabak et al. (US 2003/0002568).

Regarding claims 4, 8, 19, 25, and 31:

Huang et al. and Strom et al. disclose all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of soft decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of soft decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and to reduce noise and interference in the system. In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Regarding claim 5, 9, 18, 24, and 30:

Huang et al. and Strom et al. disclose all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of hard decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of hard decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and to reduce noise and interference in the system. In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KABIR A. TIMORY whose telephone number is (571)270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611